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SYNOPSIS OF THE FAMILIES OF VERTEBRATA.

BY E. D. COPE.

IN the following pages the attempt is made to bring together the information which we possess as to the characters of the divisions of the Vertebrata above families which are available for the determination of their relations by the paleontologist. These characters must be of the first importance to the discovery of the phylogenies, since the soft parts are unavailable. It is, however, true that the relations of these to the hard parts are close enough to render our inferences from the latter generally safe. Fortunately, also, the living remnants of extinct groups are sufficiently numerous to enable us to check our studies of the osteology. Thus we have the Branchiostoma, the lampreys, the Ceratodus and Lepidosiren, the Sphenodon, and the Monotremata, to which to refer when we desire to learn approximately the characters of the soft anatomy of ancient forms.

All the characters of the various divisions are not given. In fact, when all extinct forms come to be known, no division is likely to be defined by more than one character. At present several characters may be often ascribed to various divisions, but one of these will ultimately prove to be the essential one. It is the object of the present synopsis to bring these definitive characters into prominence; hence they are always stated first. The method of keys is adopted as the most perspicuous method of exhibiting them.

We are embarrassed in the endeavor to present the relations of the earliest and lowest Vertebrata by a want of knowledge of their

structure, and by the absence from our collections of numerous intermediate forms which must have existed. Until our knowledge is more complete the arrangement, especially of the contents of the class Agnatha, must be regarded as largely provisional.

The ossification of the skeleton of the Vertebrata has developed first on the exterior of the head and body, and in the sheath of the chorda dorsalis, and has then penetrated inwards. The limbs have preceded in time the arches (scapular and pelvic) to which they are, in the higher forms, attached. Hence we find in such genera as *Cephalaspis* and *Bothriolepis*, pectoral limbs without a scapular arch, but with merely dermal ossifications to which they are attached. This is parallel to the general absence of pelvic arch in most fishes. The limbs themselves are supposed to be radial ossifications in primitive longitudinal folds of the body integument, some of which remain in large part, as the dorsal fin of various fishes; while more frequently but few of the radii remain, as in the limbs of most Vertebrata.

The branch Vertebrata is divided into the following super-classes :

- No skull nor skeleton; notochord short, anterior,
temporary; nervous center a longitudinal cord; *Hemichorda*.
- No skull nor skeleton; notochord caudal only;
nervous center a ganglion; *Urochorda*.
- No skull; notochord extending throughout the
body, included in a membranous sheath, as is
the cord-like nervous axis above it; *Cephalochorda*.
- A cartilaginous or bony skull and skeleton, which
extends throughout the body; central nerv-
ous system a longitudinal cord terminating
in a brain within the skull; *Craniata*.

HEMICHORDA.

There is but one class of Hemichorda.

- Not metameric; no mantel; respiratory fissures
on each side of the pharynx; alimentary
canal with openings at opposite extremities
of body;

Enteropneusta.

ENTEROPNEUSTA.

But one order of this class is yet known.

No appendages to the body except an oval

mass extending in front of the head; *Helminthophya.*

The order *HELMINTHOPHYA* embraces but one family, the *Balanoglossidæ*.

UROCHORDA.

There is but one class of Urochorda; viz.:

Not metameric; a mantel covering the body; respiration

pharyngeal; heart distinct, saccular; *Tunicata.*

TUNICATA.

There are two orders of Tunicata.

Inhalent and exhalent openings close together; ali-

mentary canal elongate; *Ascididæ.*

Inhalent orifice and anus at opposite extremities; ali-

mentary canal crowded into a body termed a
nucleus; *Thaliacea.*

To the *ASCIDIÆ* belong the families Appendiculariidæ, Clavelinidæ, Ascidiidæ, Botryllidæ, Didemnidæ, Polyclinidæ, and Pyrosomidæ. To the *THALIACEA* are referred the families Salpidæ and Doliolidæ.

CEPHALOCHORDA.

The only class of the Cephalochorda is the following:

No mantel; walls of the body muscular myotomes;

no jaws nor extremities; pharyngeal walls fis-

sured; heart a longitudinal vessel, which gives

off branchial vessels, which unite into an aorta;

a liver and vena cava present; *Acrania.*

Of the class *ACRANIA* but one order as yet known.

Pharyngeal fissures enclosed externally by a fold of

the integument, which encloses a chamber

(atrium) which opens inferiorly; openings of

alimentary canal at opposite extremities; heart

tubular; *Leptocardii.*

The only family of the *LEPTOCARDII* is the *Branchiostomidæ*.

CRANIATA.

I. No lower jaw nor pectoral arch.

Internal skeleton not ossified ;

Agnatha.

II. Lower jaw and pectoral arch present.

a. Basicranial axis not ossified ; vertebral column consisting chiefly of intercentra.

Limbs represented by many-radiate fins, which are also present on the median lines of the body ; a coracoid bone ; heart with two chambers ; no internal nares ;

Pisces.

Limbs consisting of one basal element, two propodials, and metapodials and digits ; no median fins ; no opercular bones ; a coracoid ; heart with three chambers ; two occipital condyles ; internal nares ;

Batrachia.

aa. Basicranial axis ossified ; vertebral column consisting chiefly of centra. An amnion and allantois.

Limbs as in *Batrachia* ; one occipital condyle ; a suspensorium of the lower jaw ; mandible segmented ; heart with three chambers ;

Monocondylia.

Limbs as in *Batrachia* ; two occipital condyles ; no suspensorium of the lower jaw ; mandible not segmented ; heart with four chambers ;

Mammalia.

AGNATHA.

The known members of the class AGNATHA are a very small representation of those that once existed ; and they present a great variety of character, having little affinity with each other. Two sub-classes are most distinctly indicated.

An osseous dermal skeleton with lateral limb-like appendages ;

Ostracodermi.

No osseous skeleton, nor lateral limb-like appendages ;

Marsipobranchii.

OSTRACODERMI.

The orders of this division are two.

Orbits well separated ; no nostrils ;

Arrhina.

Orbits separated by a plate which is pierced by two
orifices, possibly nostrils ;

Diplorrhina.

To the ARRHINA belong the families of the Pteraspidae and Cephalaspidae, and to the DIPLORRHINA that of the Mycteropidae. The latter has some affinity to the Pterichthyidae, which has similarly approximated orbits, or orifices which correspond with those provisionally termed orbits in Mycterops. They are separated in the Pterichthyidae by a movable plate which is not perforated. Pterichthyidae differ in the possession of a peculiar dorsal shield, which resembles that of the Tunicate germs Chelyosoma. The tail, present in Pterichthys, is wanting in Bothriolepis, calling to mind the absorption of the tail in the Tunicates. The lateral appendages resemble, those of the Tunicate genus Appendicularia. For the above reasons I have placed the Pterichthyidae in the Tunicata, as the type of a distinct order, the Antiarcha. This order may belong to the Ostracodermi.

MARSIPOBRANCHII.

This subclass has two orders.

Branchial fissures communicating directly with the
pharynx ; nasal sac perforating the palate ;

Hyperotreti.

Branchial fissures communicating with a common
branchial passage which opens into the pharynx ;
nasal sac not perforating palate ;

Hyperoarti.

To the HYPEROTRETI belong two families, the Myxinidae and the Bdellostomidae ; to the HYPEROARTI one, the Petromyzontidae.

PISCES,

This class is divided into four subclasses.

I. No suspensorium of the mandible.

No dermal cranial ossifications ; ventral claspers ;
no opercular bones ; no maxillary arch ;

Holocephali.

Dermal cranial ossifications and opercular bones ;
no claspers ; no maxillary arch ;

Dipnoi.

II. A suspensorium of the mandible.

No dermal cranial ossifications nor opercular
bones ; claspers present ;

Elasmobranchii.

Dermal cranial ossifications and opercular bones ;
no claspers ; a maxillary arch ;

Teleostomi.

HOLOCEPHALI.

But one order of this subclass known.

A single external branchial fissure ; actinotrichia present ; basilar, axonosts and neural spines articulating with each other ; pectoral fin with three axonosts and numerous basilar ; ventrals with elongate axonosts and basilar ;

Chimæroidei.

The order CHIMÆROIDEI embraces only the family Chimæridæ.

DIPNOI.

There is but one order of this subclass known as yet.

Actinotrichia ; baseosts and axonosts of median fins continuous with neural spines ; paired fins with a single basal axonost and numerous segments continuous with it ; swim-bladder cellular ;

Sirenoidei.

Three families represent our knowledge of the order SIRENOIDEI ; the Dipteridæ, the Ceratodontidæ, and the Lepidosirenidæ.

ELASMOBRANCHII.

There are two orders of this subclass.

A basioccipital and exoccipital elements ; actinotrichia ; baseosts and axonosts continuous with neural spines ; paired fins with a single basal axonost, and numerous others in line with it ; claspers simple ;

Ichthyotomi.

No basi or exoccipital ; median baseosts and axonosts continuous with vertebral spines ; several axonosts to paired fins, and numerous baseosts ; claspers complex ; actinotrichia ;

Selachii.

To the order ICHTHYOTOMI belong the families Xenacanthidæ and Cladodontidæ. To the SELACHII belong the following : (*Squali*), Psammodontidæ, Petalodontidæ, Cochliodontidæ, Cestra-

ciontidae, Spinacidae, Notidanidae, Lamnidae, Carchariidae, Squatinidae, Rhinobatidae, Pristiophoridae; (*Rajæ*.) Pristidae, Squatinorajidae, Rajidae, Trygonidae, Myliobatidae.

TELEOSTOMI.

There are four superorders of this subclass, which are distinguished by the fins.

Dorsal, anal, pectoral, and ventral axonosts present, represented by a single element to each fin ;

Rhipidopterygia.

Dorsal, anal, pectoral, and ventral axonosts present, the dorsal and anal numerous, the pectoral in variable number, articulating with numerous well-developed baseosts; the ventral axonost single, with numerous baseosts ;

Crossopterygia.

Dorsal and anal axonosts as in the last ; no pectoral axonost ; pectoral and ventral baseosts elongate, numerous ;

Podopterygia.

Dorsal and anal axonosts present ; no pectoral axonost ; pectoral baseosts few and small ; ventral baseosts rudimental ; dorsal, and generally anal baseosts rudimental or wanting ; axonosts not corresponding with neural spines ;

Actinopterygia.

RHIPIDOPTERYGIA.

Two orders of this superorder are known.

Basseosts present in dorsal and anal fins ; pectoral fin ?

Rhipidistia.

Basseosts wanting to dorsal and anal fins ; caudal axonosts present, each one articulating with a neural spine ; pectoral fin ?

Actinistia.

To the RHIPIDISTIA belongs the single family of the Tristichopteridae ; and to the ACTINISTIA the Coelacanthidae.

CROSSOPTERYGIA.

- I. Dorsal baseosts present ; pectoral axonosts uniserial.
 Pectoral fins a simple axis, when present ; body with
 dorsal and ventral shields ; axonosts articulating
 with neural spines ; ¹*Placodermi*.
 Actinotrichia present ; axonosts articulating with neu-
 ral spines ; *Haplístia*.
 Median fin radii equal in number and articulating with
 baseosts ; *Taxístia*.
 II. No dorsal baseosts (or rudiments only) ; pectoral axonosts
 triserial.

Median fin radii equal to and articulating with base-
 osts ; axonosts not articulating with neural spines ; *Cladístia*.

The PLACODERMI includes the families of the Coccosteidæ, and
 Dinichthyidæ.

The Phaneropleuridæ is the only known family of the HAP-
 LISTIA ; while two are known to belong to the TAXISTIA, viz.,
 the Holoptychiidæ and the Osteolepididæ. To the CLADISTIA
 belongs only the existing family of the Polypteridæ.

PODOPTERYGIA.

One order of this superorder is known.

Median fins with actinotrichia, and with baseosts
 and axonosts corresponding with each other and
 with neural spines ; scapular arch suspended to
 cranium by a post-temporal element ; a preora-
 coid arch and interclavicles ; no preoperculum
 nor symplectic ; a notochord ; *Chondrostei*.

To the order CHONDROSTEI belong three families, the Polyo-
 dontidæ and Accipenseridæ without, and the Chondrosteidæ with,
 branchiostegal radii.

ACTINOPTERYGIA.

Two tribes pertain to this superorder.

Ventral fins abdominal ; a ductus pneumaticus ; no
 spinous dorsal fin ; parietal bones usually in con-
 tact ; scales usually cycloid ; *Physostomi*.

¹ The position of this order is not yet certain.

Ventral fins usually thoracic or jugular; no ductus
pneumaticus; usually a spinous dorsal fin; parietal
bones usually separated by the supraoccipital;
scales usually ctenoid; *Physoclysti.*

PHYSOSTOMI.

I. Median fin rays with actinotrichia.

Intercentra distinct, small; no centra. *²Lysopteri.*

II. Median fin rays equal to and articulating with axonosts.
 α , Vertebræ complex, the pleurocentra and intercentra
distinct.

Anterior vertebræ similar; *Merospondyli.*

$\alpha\alpha$, Vertebræ with centra and intercentra both complete
on part of the column at least; amphicæalous;

Anterior vertebræ similar; *Halecomorphi.*

$\alpha\alpha\alpha$, Vertebræ (intercentra) opisthocæalous.

Anterior vertebræ similar; a precoracoid arch and
a coronoid bone; *Ginglymodi.*

$\alpha\alpha\alpha\alpha$, Vertebræ (intercentra) amphicæalous.

βA , Precoracoid arch.

γ , No symplectic bone.

Pterotic simple; anterior vertebræ modified, and
with ossicula auditus; parietals not distinct; *Nematognathi.*

Pterotic annular, including a cavity which is closed
by a distinct bone; anterior vertebræ simple,
without ossicula auditus; parietals distinct; *Scyphophori.*

$\gamma\gamma$, A symplectic bone.

Anterior vertebræ coössified and with ossicula
auditus; pterotic simple; *Plectospondyli.*

Anterior vertebræ not modified; pterotic simple;
parietals distinct; *Isospondyli.*

$\beta\beta$, No precoracoid arch.

γ , Scapular arch suspended to cranium.

δ , A symplectic.

Anterior vertebræ and pterotic simple; parietals
separated by supraoccipital; *Haplomi.*

Anterior vertebræ modified; parietals not separated; *Glanencheli.*

² This order may belong to the Protopterygia.

♂♂. No symplectic.

Anterior vertebræ simple; a preoperculum and
palatine arch;

Ichthyocephali.

γγ. Scapular arch free from cranium.

♂. A symplectic bone.

Hyoid arches developed;

Holostomi.

♂♂. No symplectic.

Opercular bones and five osseous branchial arches,
with ceratohyal;

Enchelycephali.

Opercular bones, and one osseous branchial arch,
ceratohyal;

Colocephali.

No opercular bones, nor ceratohyal, nor osseous
branchial arches;

Lyomeri.

The families of the Physostomi are as follows:

LYSOPTERI; Palæoniscidæ.

MEROSPONDYLI; Sauropsidæ; Pycnodontidæ; Stylodontidæ;
Sphærodontidæ; Macrosemiidæ.

HALECOMORPHI; Amiidæ.

GINGLYMODI; Lepidosteidæ.

ISOSPONDYLI; Dapediidæ; Lepidotidæ; Aspidorhynchidæ; Sau-
rodontidæ; Osteoglossidæ; Heterotidæ; Galaxiidæ; Clu-
peidæ; Chirocentridæ; Salmonidæ; Thymallidæ; Alepo-
cephalidæ; Gonorhynchidæ; Sauridæ; Lutodiridæ; Au-
lopidæ; Elopidae; Albulidæ; Hyodontidæ; Notopteridæ.

ACTINOCHIRI; Pelecopteridæ.

PLECTOSPONDYLI; Characinidæ; Sternopygidæ; Cobitidæ; Cyp-
rinidæ; Catostomidæ.

SCYPHOPHORI; Mormyridæ; Gymnarchidæ.

NEMATOGNATHI; Siluridæ; Hypophthalmidæ; Aspredinidæ.

HAPLOMI; Esocidæ; Stratodontidæ; Umbridæ; Cyprinodon-
tidæ; Amblyopsidæ.

GLANENCHELI; Gymnotidæ.

ICHTHYOCEPHALI; Monopteridæ.

HOLOSTOMI; Symbranchidæ.

ENCHELYCEPHALI; Nemichthyidæ; Anguillidæ; Congridæ.

COLOCEPHALI; Murænidæ.

LYOMERI; Saccopharyngidæ; Eurypharyngidæ.

PHYSOCLYSTI.

- I. Basilar bones of median fins well developed ;
 Scapular arch suspended to cranium ; pectoral fin with numerous basilar bones ; *Docopteri.*
- II. Basilar bones of median fins rudimental or wanting. Pectoral basilar few.
- A. Scapular arch suspended to the anterior vertebræ.
 Maxillary bone distinct ; no interclavicles ; epibranchials and pharyngeals present ; inferior elements distinct ; *Opsithomi.*
- AA. scapular arch suspended to cranium by a posttemporal bone.
- a. Ventral fins abdominal.
 Branchial arches developed, third superior pharyngeal enlarged ; gill fringes linear ; no interclavicles ; *Percesoces.*
- Epibranchials and superior pharyngeals reduced in number ; interclavicles ; gill-fringes linear ; *Hemibranchii.*
- Epibranchials and superior pharyngeals wanting ; gill fringes in tufts ; *Lophobranchii.*
- aa. Ventral fins thoracic or jugular.
- β. Anterior (spinous) dorsal fin expanded into transverse laminæ sessile on cranium.
- Cranium normal ; branchial bones present ; *Discocephali.*
- ββ. Spinous dorsal fin not transversely expanded.
- γ. Posttemporal projecting freely from skull.
- First vertebra united by suture to cranium ; intercalaria united behind supraoccipital ; basilar pectoral bones elongated ; *Pediculati.*
- Posterior cephalic region normal ; the anterior twisted so as to bring both orbits on one side ; inferior pharyngeals distinct *Heterosomata.*
- Cranium normal, premaxillaries usually coössified with maxillaries behind, and the dentary with the articular ; pharyngeal bones distinct ; *Plectognathi.*

Cranium normal; bones of jaws and pharyngeals distinct; *Percomorphi*.

Cranium normal, bones of jaws distinct; third superior pharyngeal much enlarged and articulated with cranium; inferior pharyngeals coösfied; *Pharyngognathi*.

rr. Posttemporal an integral part of the skull.

Cranium normal; bones of jaws distinct; pharyngeals separate; *Craniomi*.

The families of the preceding order are the following:

DOCOPTERI; Dorypteridæ (possibly Physostomous.)

OPISTHOMI; Mastacembelidæ; Notacanthidæ.

PERCESOCES; Opheocephalidæ; Mugilidæ; Atherinidæ; Sphyraenidæ; Scombresocidæ.

HEMIBRANCHII; Pegasidæ; Gasterosteidæ; Fistulariidæ; Centriscidæ; Amphisilidæ; Dercetidæ.

LOPHOBRANCHII; Solenostomidæ; Syngnathidæ; Hippocampidæ.

DISCOCEPHALI; Echeneididæ.

PEDICULATI; Antennariidæ; Lophiidæ.

HETEROSOMATA; Pleuronectidæ.

PLECTOGNATHI; Triacanthidæ; Balistidæ; Tetrodontidæ; Diodontidæ; Ostraciidæ.

PERCOMORPHI; (Anacanthini) Ophidiidæ; Gadidæ; Macruridæ; (Haplodoci) Batrachidæ; (Cyclopteroidea) Cyclopteridæ; (Epilasmia) Acroneuridæ, Chætodontidæ; (Distegi) Scorpaenidæ; Cottidæ; Blenniidæ; Gobiidæ; Platycephalidæ; Rhamphocottidæ; Agonidæ; Heterognathidæ; Gerreidæ; Carangidæ; Sillaginidæ; Pristipomatidæ; Scienidæ; Sparidæ; Percidæ; Berycidæ; Scombridæ; Trichiuridæ; Xiphiadidæ; (Labyrinthici) Osphromenidæ; Anabantidæ.

PHARYNGOGNATHI; Embiotocidæ; Cichlidæ; Labridæ; Scaridæ.

CRANIOMI; Triglidæ; Dactylopteridæ.

BATRACHIA.

The eight orders of the class Batrachia are defined as follows:

I. Basioccipital, supraoccipital, intercalary and supratemporal bones present; propodial bones distinct (*Stegocephali*).

a. One occipital cotyloid articulation.

Vertebral bodies represented by basal and lateral elements (intercentra and centra);

Ganocephali.

aa. Two occipital condyles.

Vertebrae represented by distinct and incomplete intercentra and centra (pleurocentra); atlas segmented;

Rhachitomi.

Centra and intercentra complete, making two vertebral bodies to each neural arch;

Embolomeri.

No centra; intercentra, each supporting a neural arch;

Microsauri.

II. Basioccipital, supraoccipital, and supratemporal bones wanting; propodial bones distinct; no urostyle (*Urodela*).

a. An os intercalare.

Palatine arch and vomer present;

Proteida.

aa. No os intercalare.

A maxillary arch and vomers;

Pseudosauria.

No maxillary arch or vomers;

Trachystomata.

III. Basioccipital, supraoccipital, intercalare, and supratemporals wanting; frontals and parietals connate; propodial bones connate; lumbosacral vertebrae united into a urostyle (*Salientia*).

A palatine arch and vomers;

Anura.

STEGOCEPHALI.

Of the GANOCEPHALI two families are known, the Trimerorhachidæ without, and the Archegosauridæ with neural spines of the vertebrae.

The RHACHITOMI possess but one family, the Eryopidæ. To this family belongs the Labyrinthodontia.

Of the EMBOLOMERI one family is known, the Cricotidæ.

The MICROSAURI embraces the following families; Branchiosauridæ; Hylonomidæ; Molgophidæ; Phlegethontiidæ.

URODELA.

Under the PROTEIDA the only family known is the Proteidæ.

The PSEUDOSAURIA embraces the following families: Crypto-

chidæ; Amblystomidæ; Hynobiidæ; Plethodontidæ; Thorii-
dæ; Desmognathidæ; Salamandridæ; Pleurodelidæ; Amph-
umidæ; Caeciliidæ.

The TRACHYSTOMATA includes only the family of the Sirenidæ.

SALIENTIA.

The ANURA has the families arranged under the following sub-
orders:

Internal nostrils opening together on the middle
line; no tongue; coracoids connected by a
cartilage on each side; *Aglossa.*

Internal nostrils separate; a tongue; coracoids
connected by a separate cartilage on each
side; *Arcifera.*

Internal nostrils separate; a tongue; a single
median cartilage connecting all the coracoids;
scapular arch free; *Firmisternia.*

As in Firmisternia, but scapular arch articulated to
skull; *Gastrechmia.*

(Aglossa): Xenopidæ; Pipidæ.

(Arcifera): Discoglossidæ; Bufonidæ; Dendrophryniscidæ;
Asterophydidæ; Pelodytidæ; Scaphiopidæ; Hylidæ; Cys-
tignathidæ; Amphignathodontidæ; Hemiphractidæ.

(Gastrechmia): Hemisidæ.

(Firmisternia): Engystomidæ; Phryniscidæ; Dendrobatidæ;
Cophylidæ; Dyscophidæ; Colostethidæ; Ranidæ; Cera-
tobatrachidæ.

MONOCONDYLIA.

There are two subclasses of Monocondylia.

Anterior limbs ambulatory, with numerous carpal and
metacarpal bones; two aorta roots; integument
consisting partly of scales; *Reptilia.*

Anterior limbs volant, with the carpals and metacarpals
more or less coössified and reduced in numbers; in-
tegument consisting in part of feathers; one aorta root; *Aves.*

REPTILIA.

Nine orders of Reptilia are known.

I. The quadrate bone united with the adjacent elements by suture.

A. Cranium with one postorbital bar.

a A paroccipital bone.

A supratemporal bone; ribs two-headed on centrum; carpals and tarsals not distinct in form from metapodials;

Ichthyopterygia.

No supratemporal; sub- and post-pelvic ossifications; interclavicle and clavicles separated from and below scapular arch; ribs one-headed; coracoid large, free;

Testudinata.

aa No paroccipital bone.

Ribs mostly two-headed, capitulum intercentral; clavicles and interclavicles forming part of shoulder-girdle; no sub- or post-pelvic bones; pelvic elements below plate-like, obturator foramen small or none;

Theromora.

Ribs one-headed; scapula triradiate; no clavicles; coracoid large, distinct; no sub- or post-pelvic bones;

Plesiosauria.

AA. Cranium with two postorbital bars.

a. No paroccipital bone; (no supratemporal).

Ribs two-headed; no interclavicle; external digits greatly elongate to support a patagium;

Ornithosauria.

Ribs two-headed; no interclavicle; acetabulum perforate; feet ambulatory; no patagium;

Dinosauria.

Ribs two-headed; an interclavicle; acetabulum closed; feet ambulatory; no postfrontal bone;

Crocodylia.

Ribs one-headed; an interclavicle; acetabulum closed; feet ambulatory;

Rhynchocephalia.

II. The quadrate bone loosely articulated with adjacent elements, and only proximally.

The quadrate bone in contact only with adjacent elements; no intercalare; supratemporal present; ribs one-headed;

Squamata

The order ICHTHYOPTERYGIA embraces the families of Ichthyosauridæ and Mixosauridæ.

Two families enter the ORNITHOSAURIA, viz., the Pteranodontidæ and the Pterodactylidæ.

The DINOSAURIA embraces two suborders, as follows:

Inferior pelvic elements directed downwards; *Saurischia*.

Pelvic elements directed backwards; *Orthopoda*.

The families of the *Saurischia* are the Cetiosauridæ, Cœluridæ and Megalosauridæ. Those of the *Orthopoda* are the Agathaumidæ, Omosauridæ, Scelidosauridæ, and Iguanodontidæ.

The order CROCODILIA embraces one suborder, as follows:

Nareal canal underroofed to behind larynx; no epipterygoid, nor clavicle; pelvis excluded from acetabulum;

Eusuchia.

Under the *Eusuchia* we know the families Crocodilidæ, Goniopholidæ, and Teleosauridæ.

The RHYNCHOCEPHALIA is a varied order. Its contents fall into two suborders:

Premaxillary region forming a toothless beak; ribs with uncinatè process;

Sphenodontina.

Premaxillary region not beaked; uncinatè processes wanting;

Choristodera.

To the *Sphenodontina* belongs the Sphenodontidæ. The Champsosauridæ from the suborder Choristodera, on account of their many peculiarities, the most important of which now known is the separation of the *os dentatum* from the axis.

The order TESTUDINATA presents four subordinal modifications, as follows:

I. No descending processes of the parietal bones.

Vertebræ and ribs free and separated from a bony exoskeleton; no descending processes of the parietals;

Athecæ.

II. A carapace and plastron, and descending process of parietals.

a. Sacral and caudal ribs articulating with neural arches only.

Neck bending in vertical plane, last cervical articulating with first dorsal by zygapophyses only; pelvis not anchylosed; marginal bones wanting or rudimental;

Trionychoidea.

aa. Sacral and caudal ribs articulating with body of vertebræ only.

As the last; but marginal bones present and connected with ribs, and last cervical and last dorsal vertebræ articulating by bodies; pelvis not anchylosed to plastron.

Cryptodira.

Neck bending in horizontal plane, the last cervical and first dorsal vertebræ articulating by bodies; pelvis anchylosed to carapace and plastron; marginal bones present and connected with ribs;

Pleurodira.

The *Atheca* includes the single family of the Dermochelydæ.

The *Trionychoidea* includes only the Trionychidæ.

The *Cryptodira* embraces the Cheloniidæ, Testudinidæ, Cynosternidæ, Dermatemydidæ, Chelydridæ, Baënidæ and Adocidæ.

The *Pleurodira* includes the Pleurosternidæ, Sternotheridæ, Pelomedusidæ, Plesiochelydidæ, Chelydidæ and Carettochelydidæ.

The order THEROMORA includes six suborders.

I. Palate closed except posteriorly.

A temporal foramen;

Placodontia.

II. Palate open anteriorly for nares.

A. The coracoid bone large, reaching sternum.

Dentition abundant; pubis and ischium plate-like; ribs one-headed;

Proganosauria.

Dentition abundant; ribs two-headed;

Parasuchia.

Four or five sacral vertebræ; centra not notochordal; no intercentra; dentition imperfect or wanting; obturator foramen minute;

Anomodontia

AA. The coracoid reduced, not reaching sternum.

Ribs two-headed; two or three sacral vertebræ;

centra generally notochordal ; intercentra
generally present ; dentition abundant ; *Pelycosauria*.
Ribs single-headed ; temporal fossa overroofed ;
dentition abundant ; intercentra ; *Cotylosauria*.

The *Placodontia* include the Placodontidæ only. The *Parasuchia* include the Belodontidæ, and probably the Aëtosauridæ. The *Progansauria*, the Mesosauridæ, the Procolophonidæ, Palæohatteriidæ, Homœosauridæ, Proterosauridæ and Rhynchosauridæ. The *Cotylosauria* include the Pariasauridæ and the Diadectidæ.

The *Pelycosauria* embraces the families of the Clepsydripidæ, Pariotichidæ, and Bolosauridæ. The *Anomodontia* includes the single family of the Dicynodontidæ, and perhaps the Endothiodontidæ.

The PLESIOSAURIA embraces the following families : Plesiosauridæ, Nothosauridæ, and Lariosauridæ.

The SQUAMATA is an extended group, which is represented by three sub-orders, which are defined as follows :

Alisphenoid modified as epipterygoid, or wanting,
leaving brain-case open ; parietals flat ; an
interclavicle and clavicle ; teeth with dentinal
roots ; *Lacertilia*.

Epipterygoid present ; parietals decurved, partially enclosing brain-case ; no clavicle nor
interclavicle ; teeth with osseous roots ; *Pythonomorpha*.

No epipterygoid ; brain-case enclosed in front ; no clavicle nor interclavicle ; no fore-limbs ; *Ophidia*.

The LACERTILIA embraces the following superfamilies.

I. Proötic not produced beyond arched body ; acrodont ;
olfactory lobes not underarched ; two suspensoria.

No clavicle nor interclavicle ; no columella ;
tongue papillose, extremity sheathed ; *Rhoptoglossa*.

A clavicle proximally simple ; an anchor-shaped interclavicle ; a columella ; tongue
papillose, not sheathed ; *Acrodonta*.

II. Proötic bone not produced beyond arched body ; dentition pleurodont ; olfactory lobes not underarched ;
two suspensoria.

A clavicle proximally simple ; an anchor-shaped interclavicle ; a columella ; tongue papillose, not sheathed ;

Iguania.

III. Proötic bone not produced beyond arched body ; dentition pleurodont, or nearly so ; two suspensoria.

a. Clavicle simple proximally ; olfactory lobes not underarched by frontal.

Interclavicle cruciform ; tongue papillose ;

Diploglossa.

aa. Clavicle proximally simple ; olfactory lobes underarched by frontal.

Vertebræ procœlous ; tongue smooth ;

Thecaglossa.

Vertebræ amphicœlous ; tongue papillose ;

Geckovarani.

aaa. Clavicle proximally expanded ; olfactory lobes underarched by os frontale.

Tongue papillose or smooth ;

Nyctisaura.

aaaa. Clavicles, when present, expanded proximally ; olfactory lobes not underarched.

Clavicles, interclavicle, and sternum present ;

surangular distinct ; tongue scaly ;

Leptoglossa.

Clavicles, interclavical and sternum absent ;

tongue scaly ;

Typhlophthalmi.

IV. Proötic bone produced beyond arched body ; one suspensorium (=supratemporal wanting) ; pelvic arch rudimentary or wanting.

Frontal bone underarching olfactory lobes ; supraoccipital gomphosis internal ; no orbitosphenoid ;

Anguisauri.

Frontal bone underarching olfactory lobes ; supraoccipital gomphosis external ; an orbitosphenoid ;

Opheosauri.

The families of these suborders are the following :

Rhaptoglossa ; *Chamæleonidæ*.

Acrodonta ; *Agamidæ*.

Iguania ; *Iguanidæ*, *Anolidæ*.

Diploglossa ; *Zonuridæ*, *Pygopodidæ*, *Anguidæ*, *Xenosauridæ*,

Helodermidæ.

Thecaglossa ; *Varanidæ*.

Geccovarani; Uroplatidæ.

Nyctisaura; Eublepharidæ, Geconidæ.

Leptoglossa; Xantusiidæ, Teidæ, Lacertidæ, Gerrhosauridæ, Scincidæ.

Typhlophthalmi; Acontiidæ, Anelytropidæ.

Anguisauri; Aniellidæ.

Opheosauri; Chirotidæ, Amphisbænidæ, Trogonophidæ.

The PYTHONOMORPHA embraces two families, the Plioplatecarpidæ, and the Mosasauridæ.

The OPHIDIA include the following superfamilies.

A. Supratemporal intercalated in the cranial walls. (*Angiostomata*.)

a. No ectopterygoid; palatines bounding choanæ posteriorly; ethmoturbinal forming part of roof of mouth; rudiments of a pelvis. (*Scolecophidia*.)

Maxillary bone fixed to prefrontal and premaxillary; a pelvis;

Catodonta.

Maxillary bone vertical and free from all others; no pelvis;

Epanodonta.

aa. An ectopterygoid; palatines not bounding choanæ posteriorly.

Maxillary bone free, horizontal;

Tortricina.

AA. Supratemporal attached scale-like to cranial walls, produced freely posteriorly; ectopterygoid present (*Eurystomata*.)

Maxillary bone horizontal, in contact with the premaxillary, and furnished with solid teeth; no rudiments of pelvis;

Asinea.

Maxillary bone horizontal, thickened in front, and not reaching premaxillary, and bearing a perforate tooth;

Proteroglypha.

Maxillary bone vertical, not reaching premaxillary, articulating with the prefrontal by a ginglymus, and to the ectopterygoid without imbrication, and bearing a perforated tooth;

Solenoglypha.

The families embraced by these superfamilies are as follows:

Catodonta; Stenostomidæ.

Epanodonta; Typhlopidae.

Tortricina; Tortricidae, Uropeltidae.

Asinea; Xenopeltidae, Pythonidae, Boidae, Charinidae, Achrochordidae, Nothopsidae, Colubridae.

Proteroglypha; Hydrophidae, Najidae, Elapidae, Dendraspididae.

Solenoglypha; Causidae, Atractaspididae, Viperidae, Crotalidae.

AVES.

There are four superorders of the birds, as follows:

Metacarpal and carpal bones all distinct, the digits with ungues; caudal vertebræ numerous, unmodified; clavicles united; pelvic elements distinct; teeth present;

Saururæ.

Metacarpals and carpals coössified; digits without ungues; caudal vertebræ moderately numerous, without ploughshare bone; clavicles distinct; pelvic elements coössified; teeth present;

Odontolcæ.

Metacarpals and pelvic elements coössified; caudal vertebræ reduced, with a pygostyle or plowshare bone; vertebræ biconcave; teeth present;

Odontotormæ.

Metacarpals and carpals coössified; pelvic elements coössified; clavicles coössified; caudal vertebræ few, terminating in a plowshare bone; vertebræ mostly saddle-shaped; no teeth;

Eurhipiduræ.

The SAURURÆ includes but one order, which is defined as follows:

Vertebræ biconcave; feathers arranged in one series on each side of the caudal vertebræ;

Ornithopappi.

To this order but one family belongs, viz., the Archæopterygidae.

The superorder ODONTOLCÆ includes also but one order.

Teeth in a groove; sternum without keel; wings rudimental; pelvic bones free posteriorly;

Dromæopappi.

The DROMÆOPAPPI has but one family, the Hesperornithidae.

To the ODONTOTORMÆ one order only is referred. It is thus characterized :

Teeth in sockets; sternum keeled; wings well developed; ischium and pubis free posteriorly;

Pteropappi.

The family of the Ichthyornithidæ is the only one known to belong to the PTEROPAPPI.

The superorder EURHIPIDURÆ includes all recent birds. There are three orders, which are defined as follows :

Palate dromæognathous; pelvic elements free posteriorly;

Dromæognathæ.

Palate not dromæognathous; pubis free from ischium; integument covered uniformly with feathers, which are not differentiated on the wings;

Impennes.

Palate not dromæognathous; vertebræ mostly saddle-shaped; ilia and ischia anchylosed behind; ilia anchylosed to sacrum; mandibular rami coössified at symphysis; feathers with definite local distribution, those of the fore limb much deferentiated;

Euornithes.

The DROMÆOGNATHÆ include the following suborders:

Sternum without keel; clavicles; wings rudimental; *Struthiones.*

Sternum without keel; no clavicles; wings rudimental; *Apteryges.*

Sternum with keel; clavicles; wings rudimental; *Gastornithes.*

Sternum with keel; clavicles; wings functional; *Crypturi.*

The families belonging to these orders are the following:

Struthiones; Struthionidæ, Rheidæ, Casuariidæ, Dromæidæ, Dinornithidæ, Aepiornithidæ.

Apteryges; Apterygidæ.

Gastornithes; Gastornithidæ.

Crypturi; Crypturidæ.

To the IMPENNES but one suborder belongs. This is the Ptilopteri.

Ilium not anchylosed with sacrum; bones of wing not foldable on each other; metacarpals not separated; hallux directed forwards; feathers scale-like; vertebræ opisthoccelous;

Ptilopteri.

The Ptilopteri includes the single family of the Aptenodytidae or penguins.

The EUORNITHES include numerous suborders, which are defined as follows:

I. Maxillopalatines united across the middle of the palate.
(*Desmognathæ*).

A. Four toes directed forwards (pamprodactylous).

Toes webbed; no basipterygoids; *Steganopodes*.

Toes free; vomer unossified; no basipterygoid processes; *Colioidei*.

AA. Three toes directed forwards.¹

Short basipterygoid processes; toes generally webbed; præcocial; *Chenomorphæ*.

No basipterygoid processes; bill and legs slender; toes generally free; altricial; *Herodii*.

Bill and claws hooked; toes free; altricial; vertebræ saddle-shaped; *Accipitres*.

Bill hooked; toes free; vertebræ opisthocœlous; rostrum movably articulated with skull; basipterygoids; *Heterospondyli*.

Toes free; vertebræ saddle-shaped; rostrum fixed; *Coccygomorphæ*.

AAA. Two toes directed forwards and two backwards.

Rostrum freely articulated with the skull; vertebræ opisthocœlous; *Psittaci*.

II. Maxillopalatines not united across the palate; vomer narrowed and acute in front. (*Schizognathæ*).

A. Toes three forwards (anisodactylous).

Schizorhinal; toes webbed; *Cecomorphæ*.

Toes free; legs long; feathers with after shaft; præcoces; *Grallæ*.

No basipterygoids; lachrymal bones coössified with rostrum; toes free; *Opisthocomi*.

Toes free; hallux rudimental; *Gallinæ*.

Toes free; hallux well developed; two carotids; *Pullastræ*.

Toes free; hallux well developed; one carotid artery; basipterygoids; *Micropodioidi*.

¹ Except Cuculidæ, which are zygodactylous.

AA. Toes two in front (heterodactylous).

Toes free; hallux well developed; basipterygoids present;

Trogonoidæ.

III. Maxillopalatines not united on median line; vomer single, truncate, and excavated in front. (*Ægithognathæ.*)

A. Toes three in front (anisodactylous).

Toes free; hallux well developed; tarsometatarsus with five tendinous canals; basipterygoids wanting or rudimental; sternum with two notches; no cæca coli; one carotid artery;

Passeres.

AA. Four toes directed forwards (pamprodactylous).

Toes free; no basipterygoids; sternum entire posteriorly; tensor patigii brevis muscle attached to a tendon which extends to the manus; no cæca;

Micropodoidæ.

IV. Maxillopalatines separate; vomer double, represented by two laminæ. (*Saurogathæ.*)

A. Two toes directed forwards.

Feet zygodactylous; no cæca coli; no interclavicle; one carotid artery;

Picoidei.

The arrangement of the above orders is not expressive of their true affinities in all cases. Thus the Colioidei, Coccygomorpha, Micropodoidæ, Trogonoidæ, and Picoidei, are more or less related, and sometimes brought together into a single heterogeneous order called the Picariæ.

The families of the EUORNITHES are as follows:

Steganopodes; Phætonidæ, Fregatidæ, Pelecanidæ, Sulidæ, Phalacrocoracidæ, Plotidæ.

Chenomorpha; Palamedeidæ, Anatidæ, Phœnicopteridæ.

Herodii; Ibiidæ, Ciconiidæ, Balænicipitidæ, Ardeidæ.

Accipitres; Cathartidæ, Falconidæ, Pandionidæ, Strigidæ.

Psittaci; Psittacidæ.

Cecomorpha; Colymbidæ, Heliornithidæ, Alcidæ, Laridæ, Procellariidæ.

Grallæ; Chionidæ, Thinocoridæ, Glareolidæ, Dromadidæ, Charadriidæ, Otididæ, Eurypygiidæ, Rhinocetidæ, Cariamidæ, Psophiidæ, Gruidæ, Rallidæ.

Opisthocomi ; *Opisthocomidæ*.

Gallinæ : *Tetraonidæ*, *Phasianidæ*.

Pullastræ ; *Cracidæ*, *Megapodiidæ*, *Pteroclidæ*, *Dididæ*, *Columbidæ*.

Colioidei : *Coliidæ*.

Heterospondyli ; *Steatornithidæ*.

Coccygomorphæ ; *Cuculidæ*, *Coraciidæ*, *Alcedinidæ*, *Upupidæ*, *Musophagidæ*, *Todidæ*, *Momotidæ*, *Bucerotidæ*, *Rhamphastidæ*, *Caprimulgidæ*, *Bucconidæ*, *Indicatoridæ*.

Micropodioidei ; *Cypælidæ*, *Trochilidæ*.

Trogonoidi ; *Trogonidæ*.

Picoideæ ; *Picidæ*.

Passeres. This order is divided into five superfamilies as follows :

Tensor patagii brevis picarian ; *Menuroidi*.

Tensor patagii brevis pas- serine; syr- inx,	{	Mesomy- odian,	{	desmopelmous ;	<i>Eurylæmoidei</i> .
				bronchiotracheal ;	<i>Tyrannoidei</i> .
				schizopelmous,	
				tracheal ; schizo- pelmous.	<i>Formicaroidi</i> .
				Acromyodian schizopelmous ;	<i>Passeroidei</i> .

The families of these superfamilies are the following :

Menuroidi ; *Menuridæ*, *Atrichornithidæ*.

Eurylæmoidei ; *Eurylæmidæ*.

Tyrannoidei ; *Xenicidæ*, *Philepittidæ*, *Pittidæ*, *Tyrannidæ*, *Cotin-
gidæ*, *Phytotomidæ*.

Formicaroidi : *Conopophagidæ*, *Pteroptochidæ*, *Formicariidæ*.

Passeroidei ; *Alaudidæ*, *Motacillidæ*, *Timaliidæ*, *Liotrichidæ*, *Muscicapidæ*, *Turdidæ*, *Cinclidæ*, *Troglodytidæ*, *Chamæi-
dæ*, *Hirundinidæ*, *Artamidæ*, *Laniidæ*, *Paridæ*, *Paradisidæ*, *Corvidæ*, *Sturnidæ*, *Meliphagidæ*, *Nectariniidæ*, *Certhiidæ*, *Ploceidæ*, *Tanagridæ*, *Icteridæ*, *Fringillidæ*.

MAMMALIA.

Two subclasses are known to belong to this class.

An interclavicle ; a large coracoid articulating with
the sternum ;

Prototheria.

No interclavicle; coracoid very small, coössified

with scapula; not reaching sternum; *Eutheria.*

Of the PROTOTHERIA, there are probably three orders of which species are known, but the location of the two first enumerated below is not certain.

Incisors reduced; molars with compressed cutting

crowns, and undivided roots; *Protodonta.*

Incisors enlarged; molars with tubercular grind-

ing surfaces, and distinct roots; *Multituberculata.*

No true teeth at maturity;

Ornithostomi.

The families are the following:

Protodonta; Dromatheriidae.

Multituberculata; Tritylodontidae, Plagiaulacidae, Chirogidae, Polymastodontidae.

Ornithostomi; Ornithorhynchidae, Echidnidae.

The EUTHERIA are represented by the following numerous orders.

I. Marsupial pelvic bones (generally); palate perforated; (vagina double; placenta wanting; corpus callosum rudimental; cerebral hemispheres small.) (*Didelphia.*)

One deciduous molar tooth; *Marsupialia.*

II. No marsupial bones; palate generally entire; (one vagina; placenta and corpus callosum well developed.) (*Mono-delphia.*)

A. Posterior limbs wanting, or represented by minute rudiments; anterior limbs oar-like. (*Mutilata.*)

Elbow joint inflexible; carpals discoid, and, with the phalanges, separated by cartilage; lower jaw without ascending ramus;

Cetacea.

Elbow joint flexible; carpals and phalanges with close articulations; mandible with ascending ramus;

Sirenia.

AA. Posterior limbs present; ungual phalanges compressed and curved on one or all the feet.³ (*Unguiculata.*)

³ Except Mesonychidae, some Glires, and posterior feet of some Edentata.

- β . Carpal and tarsal bones generally in linear series.
 γ . Teeth without enamel; no incisors.
 Limbs ambulatory; hemispheres small; *Edentata*.
 $\gamma\gamma$. Teeth with enamel; incisors present.
 No postglenoid process; mandibular condyle not transverse; mastication proal; limbs not volent; hemispheres small; *Glires*.
 Anterior limbs volent; hemispheres small; *Chiroptera*.
 A postglenoid process; mandibular condyle transverse; mastication orthal, no scapholunar bone;⁴ hemispheres small, smooth; *Bunotheria*.
 A postglenoid process; limbs not volent, with a scapholunar bone; mastication orthal; hemispheres larger, convoluted; *Carnivora*.
 $\beta\beta$. Carpal and tarsal bones alternating; faceted.
 Anterior limbs prehensile; mandibular condyle, and mastication transverse; *Ancylopoda*.
 AAA. Posterior limbs present; ungual phalanges not compressed and hooked.⁵ (*Ungulata*).
 β . Carpal, and usually tarsal bones in linear series.⁶
 Limbs ambulatory; teeth with enamel; *Taxeopoda*.
 $\beta\beta$. Tarsal bones alternating; carpals linear or reversed diplarthrous.
 Cuboid bone partly supporting navicular, not in contact with astragalus; no canine teeth; *Proboscidea*.
 $\beta\beta\beta$. Both tarsal and carpal series more or less alternating; the distal row inwards.
 Os magnum not supporting scaphoides; cuboid supporting astragalus; superior molars tri-tubercular; *Amblypoda*.
 Os magnum supporting scaphoides; superior molars quadritubercular;⁷ *Diplarthra*.

⁴ Except *Talpa* and *Erinaceus*.⁵ Except in the *Hapalidæ*.⁶ Except in *Dendrohyrax*.⁷ Except *Pantolestidæ*.

The families embraced in the above orders are the following :

MARSUPIALIA ; (*Polyprotodontia*) ; Triconodontidæ, Amphitheriidæ, Myrmecobiidæ, Dasyuridæ, Didelphidæ, Peramelidæ ; (*Diprotodontia*) ; Phascolomyidæ, Phalangistidæ, Tarsipedidæ, Diprotodontidæ, Macropidæ, Thylacoleontidæ.

CETACEA ; (*Archæoceti*) ; Zeuglodontidæ ; (*Odontoceti*) ; Squalodontidæ, Platanistidæ, Physeteridæ, Delphinidæ, (*Mystacoceti*) ; Balænidæ.

SIRENIA ; Prorastomidæ, Halitheriidæ, Manatidæ, Halicoridæ, Rhytinidæ.

BUNOTHERIA ; (*Pantotheria*) ; Amblytheriidæ ; (*Creodonta*) ; Mesonychidæ, Esthonychidæ, Arctocyonidæ, Miacidæ, Hyænodontidæ, Leptictidæ, Centetidæ ; (*Insectivora*) ; Galeopithecidæ, Tupæidæ, Solenodontidæ, Macroscelididæ, Talpidæ, Adapisoricidæ, Mythomyidæ, Scalopidæ, Chrysochloridæ, Erinaceidæ, Myogalidæ, Soricidæ ; (*Tæniodonta*) ; Ectoganidæ, Stylodontidæ ; (*Tillodonta*) ; Tillotheriidæ.

EDENTATA ; Orycteropodidæ, Manidæ, Bradypodidæ, Megatheriidæ, Myrmecophagidæ, Dasypodidæ, Glyptodontidæ.

GLIRES ; (*Simplicidentata*) ; Sciuridæ, Muridæ, Hystricidæ ; (*Duplicidentata*), Leporidæ.

CHIROPTERA ; (*Animalivora*) ; Phyllostomidæ, Desmodontidæ, Rhinolophidæ, Noctilionidæ, Vespertilionidæ, Emballonuridæ ; (*Frugivora*), Pteropidæ.

CARNIVORA ; (*Fissipedia*) ; Cercoleptidæ, Procyonidæ, Æluridæ, Canidæ, Bassarididæ, Mustelidæ, Protelidæ, Arctictidæ, Viverridæ, Cynictidæ, Suricatidæ, Cryptoproctidæ, Nimravidæ, Felidæ, Hyænidæ ; (*Pinnipedia*) ; Phocidæ, Otariidæ, Odobænidæ.

ANCYLOPODA ; Chalicotherriidæ.

TAXEPODA ; (*Condylarthra*) ; Periptychidæ, Phenacodontidæ, Meniscotheriidæ ; (*Toxodontia*) ; Proterotheriidæ, Mesotheriidæ, Toxodontidæ, Macraucheniidæ ; (*Hyracoidea*) ; Hyracidæ ; (*Daubentonioidea*) ; Chiromyidæ ; (*Quadrumanæ*) ; Mixodectidæ, Adapidæ, Anaptomorphidæ, Tarsiidæ, Lemuridæ, Hapalidæ, Cebidæ, Cercopithecidæ ; (*Anthropomorpha*) ; Simiidæ, Hominidæ.

PROBOSCIDA ; Dinotheriidæ, Elephantidæ.

AMBLYPODA ; (*Taligrada*) ; Pantolambdidæ ; (*Pantodonta*) ; Coryphodontidæ ; (*Dinocerata*) ; Uintatheriidæ.

DIPLARTHRA ; (*Perissodactyla*) ; Lophiodontidæ, Triplopidae, Cænopidae, Hyracodontidæ, Rhinocerotidæ, Tapiridæ, Lambdotheriidæ, Menodontidæ, Palæotheriidæ, Equidæ ; (*Artiodactyla*) ; Pantolestidæ, Eurytheriidæ, Anoplotheriidæ, Dichobuniidæ, Cænotheriidæ, Anthracotheriidæ, Xiphodontidæ, Suidæ, Hippopotamidæ, Merycopotamidæ, Dichodontidæ, Oreodontidæ, Poebrotheriidæ, Protolabididæ, Camelidæ, Eschatiidæ, Tragulidæ, Moschidæ, Bovidæ, Cervidæ.

NOTES ON THE ARCHEOLOGY AND ETHNOLOGY OF EASTER ISLAND.

BY WALTER HOUGH.

EASTER Island forms the southwesterly extremity of the Polynesian Archipelago, in S. lat. 27°, W. long. 109°, about 1900 miles west of Santiago, Chili. It is roughly twelve miles long by four wide, volcanic in origin. It is inhabited now by a remnant of Malayo-Polynesian stock.

From an archeological point of view, this island is very interesting ; stone images, carved stones, subterranean dwellings, weapons, tools, cave ossuaries, etc., abound. One of the last acts of the late Professor Spencer F. Baird was to induce the Navy Department to send a vessel to explore the island, and bring back representative specimens. The U. S. S. Mohican, then at Tahiti, was detailed, and the fruits of the successful twelve days' exploration are to be seen in the North and West halls of the National Museum, consisting of several stone images, carved stones, painted slabs, and the fine collection of smaller objects procured by Paymaster W. J. Thomson, U. S. N.